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TORREYA

February, 1904

PHYSIOLOGICAL APPLIANCES — II. *

BY GEORGE E. STONE

APPARATUS FOR COLLECTING AND DETERMINING THE AMOUNT
OF OXYGEN GIVEN OFF BY AQUATIC PLANTS

The appliance shown in Fig. 3 has been used in the writer's laboratory, to some extent, for collecting and determining the amount of oxygen given off by aquatic plants. It is based on the same principles as that shown in Fig. 1,† namely, either water or mercury is employed to force the collected gas into the absorbent bulbs and return the same.

In setting up the apparatus the graduated burette and funnel are filled with water. As the gas is given off from the aquatic plants it is directed from the funnel to the burette, where it is retained, a corresponding amount of water being displaced through the tube, *a*, which should be below the water level in the cylinder below. After a required amount of gas has been collected, the pinch-cocks at *b* and *c* are closed, the funnel removed and the gas is forced over into a phosphorus or pyrogallous acid and potash bulb and then returned. The amount of oxygen absorbed is then estimated. The remaining gas can also be tested for carbon dioxide and other gases if necessary. An appliance made on this principle, provided with a smaller caliber and more finely divided burette, has its advantages for closer work.

* Continued from page 5.

† TORREYA, 4 : 2. Ja 1904.

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A much more simple apparatus, which answers the same purpose, is shown in Fig. 4. This method of demonstration we have

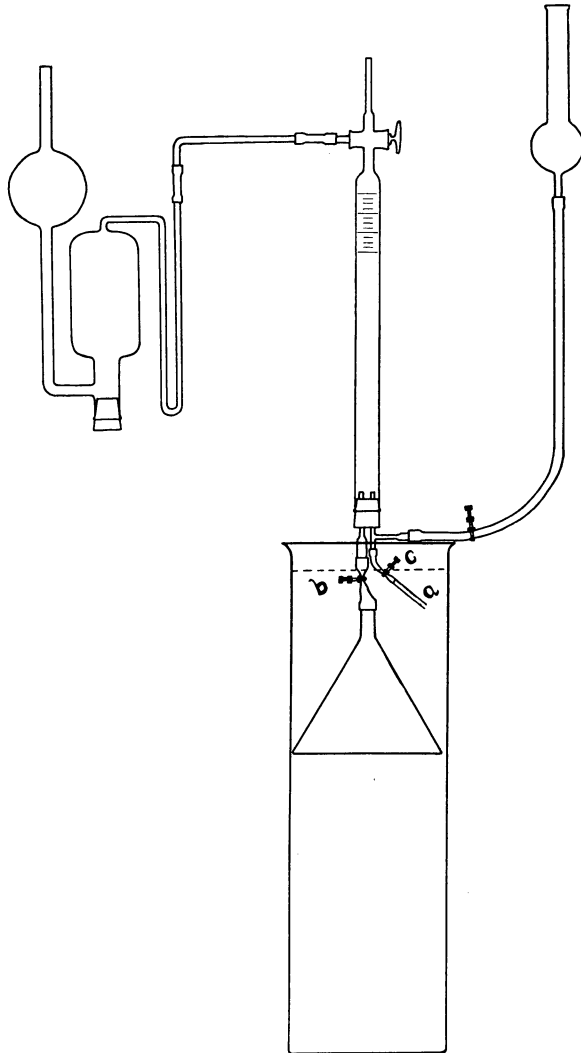


FIG. 3. Apparatus for collecting and determining the amount of oxygen given off by aquatic plants.

required of our physiological students each year. It consists of a test-tube, either plain or graduated, placed over a glass funne

in a cylinder containing aquatic plants. The test-tube is filled with water and, as the gas collects, the water is displaced. After 15 or more cc. of gas is collected, the funnel is dropped into the cylinder and a stick of phosphorus, fastened to a bent wire, shown at the right, is inserted into the tube containing the gas. The phosphorus should be left in the tube for some hours, and after removing it the difference in the water levels is noted and the per cent. of oxygen is roughly determined. In most experiments, our students find that about 33 per cent. of the gas is absorbed by the phosphorus.

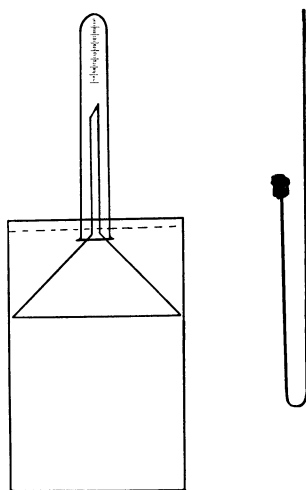


FIG. 4. Method of collecting and testing the gas given off by aquatic plants.

METHOD OF DETERMINING HOURLY TRANSPIRATION

The following method of determining the hourly transpiration of rooted plants has been occasionally employed in our laboratory. The device consists of a calcium chloride jar, to which is attached a small tube, both of which contain water. See Fig. 5.

A small light float of pith attached to a straw, carrying a wire on its upper end, registers on a blackened cylinder the variation of the water level due to transpiration. On the surface of the column of water in the small tube there are a few drops of heavy paraffine oil, *o*. This oil prevents loss of water, and serves as a suitable rider for the float. In our demonstration experiments we make use of willow cuttings which have developed roots and leaves. These cuttings are started in water and as soon as gathered they are fitted with a rubber stopper of suitable size to fit the calcium chloride jar. Rooted willow cuttings are far superior to fresh cut stems and leaves in this experiment on account of the ends of the latter becoming clogged with slimy material, thus preventing absorption and rendering the results of little value.

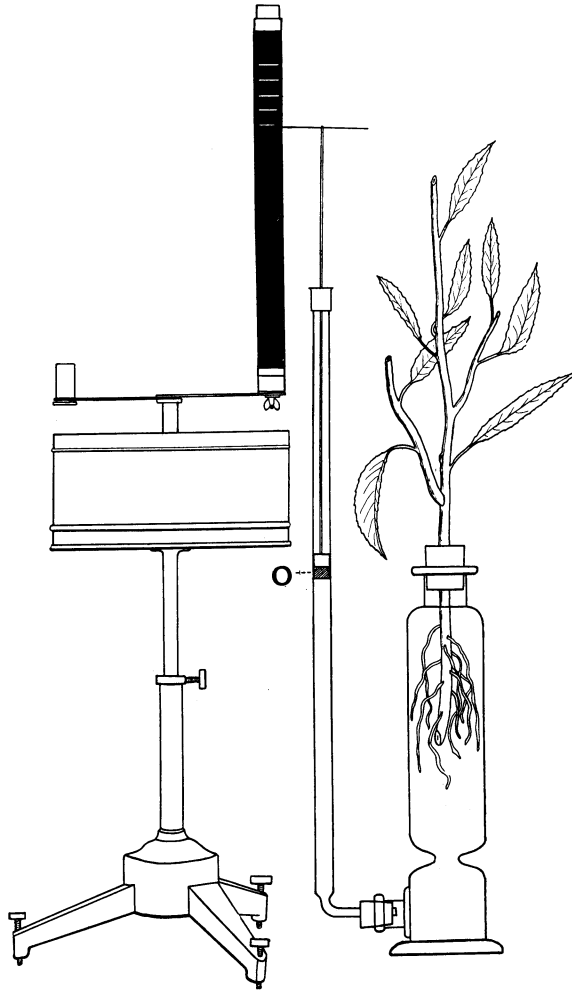


FIG. 5. Apparatus for determining hourly transpiration.

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